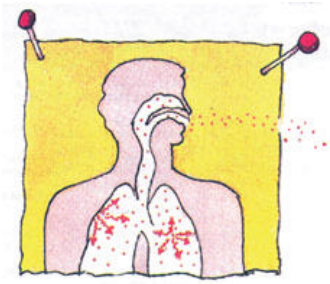
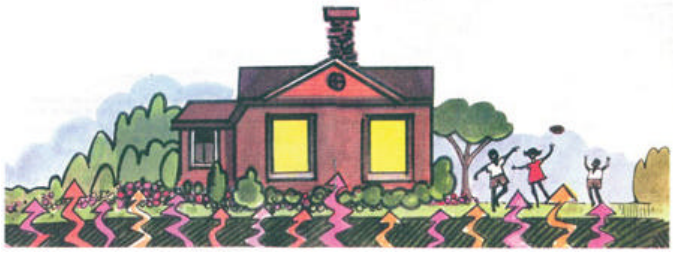
Maine Department of Human Services
Bureau of Health
Radiation Control Program

Maine Home Buyer's and Seller's Guide to Radon

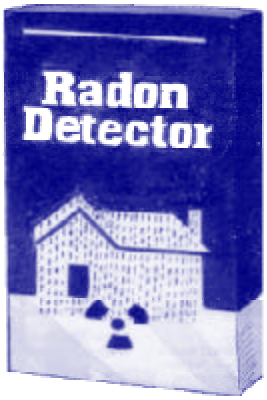


Radon is an *odorless, invisible* gas that when inhaled can cause lung cancer.



Radon can be in any home, in any area.

Have your home tested for radon today! It's easy!



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Introduction

This *Guide* answers important questions about radon, lung cancer risk, and testing for and fixing radon problems before buying or selling a home.

This *Guide* recommends three short-term testing options to be followed during real estate transactions. The radon testing guidelines in this *Guide* have been developed specifically to deal with the time sensitive nature of home purchases and sales. These guidelines are slightly different from the guidelines in other Maine (or EPA) publications, which provide radon testing and reduction information for those not buying or selling a home.

Briefly, what you need to know about radon and radon testing is:

Radon Is a Cancer-Causing, Radioactive Gas

You cannot see, smell, or taste radon. But it still may be a problem in your home. When you breathe air containing radon, you increase your risk of getting lung cancer. In fact, the Surgeon General of the United States has warned that radon is the second leading cause of lung cancer in the United States today. *If you smoke and your home has high radon levels, your risk of lung cancer is especially high.*

You Should Test for Radon

Testing is the only way to find out your home's radon levels. The EPA, the Surgeon General, and the Maine Bureau of Health recommend testing all homes for radon.

You Can Fix a Radon Problem

If you find that you have high radon levels, there are ways to fix a radon problem. Even very high levels can be reduced to acceptable levels.

If You Are Selling a Home...

The Maine Bureau of Health recommends that you have your home tested before putting it on the market and, if necessary, lower your radon levels. Maine regulations require testing a home in the lowest usable level– usually the basement. Other agencies, such as the EPA, also recommend this, because a buyer may choose to live in a lower area of the home than that used by the seller. Save the test results and all information you have about steps that were taken to fix any problems.

If You Are Buying a Home...

Maine recommends that you find out what the indoor radon level is in any home you consider buying. Ask the seller if the home has been tested; if so, what were the results, when was it tested, and who did the test. If the home has a radon-reduction system, ask the seller for information they have about the system.

If the home has not yet been tested, you should have the home tested.

If you are having a new home built, there are radon resistant features you can build into your home during construction to reduce radon levels.

Why Do I Need to Test for Radon?

Radon Has Been Found In Homes All Over the U.S.

Radon is a radioactive gas that has been found in homes all over the United States. It comes from the natural breakdown of uranium in soil, rock and water and gets into the air you breathe. Radon typically moves up through the ground to the air above and into your home through cracks and other holes in the foundation. Radon can also enter your home through well water. Your home can trap radon inside.

Any home can have a radon problem. This means new and old homes, well-sealed and drafty homes, and homes with or without basements. In fact, you and your family are most likely to get your greatest radon exposure at home. That is where you spend most of your time.

Nearly 1 out of every 3 homes in Maine is expected to have an elevated radon level (4 pCi/L or more). Contact the Maine Radon/IAQ Program at 207-287-5676 or 1-800-232-0842 (in Maine only) or on the web at www.maineradiationcontrol.org for information about radon in your area.

The Maine Bureau of Health and the Surgeon General Recommend You Test Your Home

Testing is the only way to know if you and your family are at risk from radon. The EPA, the Surgeon General, and the Maine Bureau of Health recommend testing all homes for radon.

While radon problems may be more common in some areas than in others, any home may have a radon problem. Also– homes which are next to each other can have significantly different radon levels.

Testing is the only way to know your home's radon level.

National Academy of Sciences Report on Radon

In February 1998, the National Academy of Sciences (NAS) released its report on radon and lung cancer, *The Health Effects of Exposure to Indoor Radon* (the BEIR IV report). The NAS is an independent, non-governmental, scientific organization. The NAS estimates that radon causes between 15,000 and 22,000 lung cancer deaths each year in the United States and that 12 percent of all lung cancer deaths are linked to radon. The BEIR IV Committee (Biological Effects of Ionizing Radiation) concluded that after smoking, **radon is the second leading cause of death due to lung cancer in the United States.**

I'm Selling a Home. What Should I Do?

If Your Home Has *Already* Been Tested for Radon…

If you are thinking of selling your home and you have already tested your home for radon, review the *Radon Testing Checklist* on page 23 to make sure that the test was done correctly. If the testing was done correctly, provide your test results to the buyer.

No matter what kind of test you had done, a potential buyer may ask for a new test especially if:

- You had the test done and the Radon Testing Checklist items were not met;
- You have renovated or altered your home since you tested,
- The buyer plans to live in a lower level of the house than you do, such as a basement that is suitable for occupancy but is not currently lived in; or
- The test was more than a few years ago.

If Your Home Has *Not Yet* Been Tested for Radon…

Have your home tested as soon as possible by a registered radon tester. This may save time during real estate transactions. **Maine regulations require testing be done in the lowest usable level of the home.** This means testing in the lowest level that can be used, whether you currently use that level of the home or not. A buyer may plan to use that area for living space. The result of a radon test is important information about your home's radon level that potential buyers may want to know.

If you are selling or planning to sell your home, Maine requires you to hire a registered radon tester. Call the Maine Radon/IAQ Program at 207-287-5676 or 1-800-232-0842 (in Maine only) or on the web at www.maineradiationcontrol.org for a list of registered radon testers. To understand what they will do, review the testing *Checklist* on page 23.

A Registered Radon Tester is one that **has met Maine minimum training requirements, passed an examination, and renders their services according to state approved requirements, standards, protocols and guidance.** Maine requires providers of radon measurement and mitigation services to have at least a minimum level of training, pass an appropriate exam, to adhere to State and Nationally recognized standards, procedures, protocols, and methods; and to participate in continuing education pertinent to their field. Call the Maine Radon/IAQ Program at 207-287-5676 or 1-800-232-0842 (in Maine only) or on the web at www.maineradiationcontrol.org for additional details about radon service provider requirements in Maine.

Some radon service providers also participate in private proficiency programs. For more general information on radon proficiency and radon proficiency credentialing offered by private sector organizations, visit *http://www.epa.gov/radonpro/rpp_qa.html* or call the Maine Radon/IAQ Program.

I'm Buying a Home. What Should I Do?

If the Home Has Already Been Tested for Radon…

If you are thinking of buying a home, you may decide to accept an earlier test result from the seller, ask the seller to have another test done by a Maine registered radon tester, or you may hire a Maine registered radon tester to test for you.

If you decide to accept the seller's test, make sure that the seller (or whoever did the test) followed the testing *Checklist* on page 23 and that he or she can confirm that all the items were followed. If you plan to use the seller's test, find out as soon as possible from the seller:

- The results of previous testing, and when it was done;
- Who conducted the previous test: the homeowner, a registered radon tester, or some other person;
- Where in the home the previous test was taken. Maine requires the lowest usable level of the home be tested, so be sure this was done. This is particularly important if the home seller does not use the basement. They may have tested the first floor, even though you plan to use the base-

ment that is not currently lived in but that is suitable for occupancy without renovation;

- What, if any, structural changes, alterations, or changes in the heating, ventilation, and air conditioning (HVAC) system have been made to the house since the test was done. Such changes may affect radon levels.

If you decide that a new test is needed, you should discuss it with the seller as soon as possible. Maine requires that all testing during a Real Estate transaction be conducted by a Maine registered radon tester. Contact the Maine Radon/IAQ Program at 207-287-5676 or 1-800-232-0842 (in Maine only) or on the web at www.maineradiationcontrol.org for the list of registered radon testers.

If the Home Has *Not Yet* Been Tested for Radon…

Make sure that a radon test is done as soon as possible. You should consider including provisions in the purchase contract specifying:

- Where the test will be located;
- That a Maine registered radon tester will conduct the test, (If someone other than a registered tester conducts the test during a home sale, it is not legal.)
- What type of test to do;
- When to do the test;
- How the seller and the buyer will share the test results and test costs; and
- When radon mitigation measures will be taken and who will pay for them (if necessary).
-

Make sure that the test is done in the lowest usable level of the home as per Maine regulations. This means the lowest level that you could use as living space which is finished or does not require renovations prior to use. The Maine Radon/IAQ Program or a registered radon tester can help you make sure the proper level of the home is tested..

If you decide to finish or renovate an unfinished area of the home in the future, radon tests should be taken before starting the project and after the project is finished. Radon reduction costs could be incurred if high levels are found in that area. Generally, it is less expensive to install a radon-reduction system before or during renovations rather than afterwards.

I'm Having A New Home Built. How Can I Protect My Family?

Include Radon-Resistant Techniques!

Radon-resistant techniques work. When installed properly and completely, these simple and inexpensive techniques reduce radon levels on average by 50%. These techniques may also help to lower moisture levels and those of other soil-gases.

Radon-resistant techniques:

- √ **Are Cost-Effective:** Building radon-resistant features into the house at the time of construction is usually easier and cheaper than fixing a radon problem later.

√ **Save Money:** When installed properly and completely, radon-resistant techniques can make your home more energy efficient.

√ **Make Upgrading Easier:** If high levels of radon are found, a vent fan can easily be added to the passive system to reduce radon levels further.

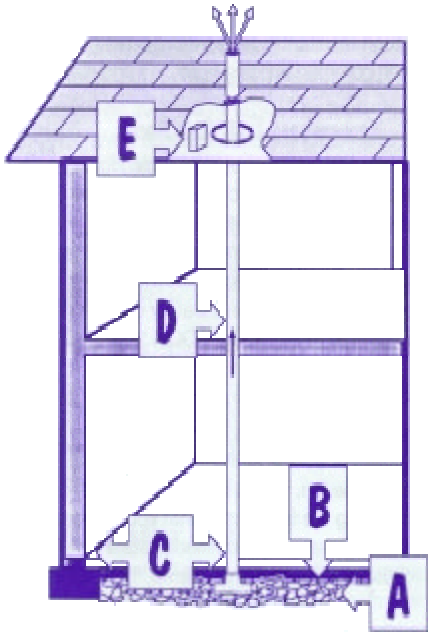
How do the ***costs of installation*** compare between a new and existing home? In a **new home**, the average cost to install radon-resistant features during construction is usually about $500. In an **existing home**, the average cost to install a radon mitigation system is about $1,200.

What Are Radon-Resistant Techniques?

Radon-resistant techniques may vary for different foundations and site requirements, but the basic elements are:

A. **Gas-Permeable Layer:** This layer is placed beneath the slab or flooring system to allow the soil gas to move freely underneath the house. In many cases, the material used is a 4-inch layer of clean gravel.

B. **Plastic Sheeting:** Plastic sheeting is placed on top of the gas-permeable layer and under the slab to help prevent the soil gas from entering the



home. In crawl spaces, the sheeting is placed directly over the crawlspace floor.

C. Sealing and Caulking: All openings in the concrete foundation and walls are sealed to reduce soil gas entry into the home.

E. **Vent Pipe:** A 4-inch PVC pipe (commonly used for plumbing) runs from the gas-permeable layer through the house and out the roof, to safely vent radon and other soil gases outdoors above the house. If the pipe does not run from below the slab to above the roof, it is probably brining radon into your home instead of venting it outdoors.

F. **Junction Boxes:** An electrical junction box is installed in case an electric in-line venting fan is needed, e.g., if the system needs to be activated later.

Remember, you still need to test to be sure the radon resistant features are keeping the radon levels low.

How Can I Get Radon-Resistant Techniques?

The simple, inexpensive techniques can be used to lower radon levels and increase energy efficiency in your new home. Over 200,000 new homes are built with these techniques each year in the United States. Follow these basic steps as your new home is being built.

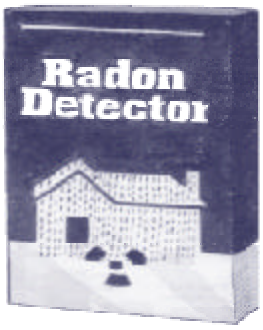
Install a Radon Reduction System: Talk to your builder about installing a radon reduction system. Contact the Maine Radon/IAQ Program (207-287-5698; toll free in Maine only: 1-800-232-0842) or on the web at *www.maineradiationcontrol.org* for guidance on radon resistant construction, to help explain the techniques to your builder. Radon resistant features can be easily installed with common building practices and materials.

Remember to Test Your Home: Every new home should be tested for radon after occupancy. Test your home even if it has the radon resistant features. Contact the Maine Radon/IAQ Program (207-287-5698; toll free in Maine only: 1-800-232-0842) or on the web at *www.maineradiationcontrol.org* to find out where to get test kits in your area.

If Radon Levels Are Still High, Activate: If your home tests at 4.0 picocuries per liter (pCi/L) or above, activate the system by installing an in-line fan. Check with the Maine Radiation Control Program office for the names of registered radon contractors in your area who can install the fan for you.

Even though you cannot see or smell radon, testing is an easy way to find out if you have a radon problem in you home.

How Can I Get Reliable Radon Test Results?

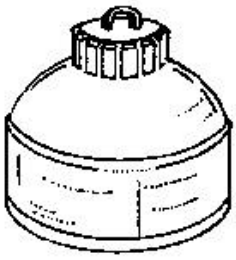


Types of Radon Test Devices

Since you cannot see or smell radon, special equipment is needed to detect it. When you are ready to test a home you are buying or selling, contact a registered radon measurement services provider, very often a home inspector, who will use a radon device appropriate for your situation. The most common types of radon testing devices are listed below. As new testing devices are developed or approved, you may want to check with the Maine Radon/IAQ Program (207-287-5698; toll free in Maine only: 1-800-232-0842) or on the web at *www.maineradiationcontrol.org* before you test to get the most up-to-date information.

Passive Devices

Passive radon testing devices do not need power to function. These include radon detectors such as **charcoal canisters, charcoal liquid scintillation devices,** and **electret ion chamber detectors**. These devices are exposed to the air in the home for a specific period of time and then sent to a laboratory for analysis. Both short-term and long-term passive devices are generally inexpensive.



Electret Ion Detector

Charcoal Canister

Some of these devices may have features that offer more resistance to test interference or disturbance than other passive devices. Professional radon testers may use any of these devices to measure the home's radon level.

Active Devices

Active radon testing devices require power to function. Active radon detectors such as **continuous radon monitors and continuous working level monitors** require operation by trained testers**.** They work by continuously measuring and recording the amount of radon or its decay products in the air of the home.

Many of these devices provide a report of this information that can reveal any unusual or abnormal swings in the radon level during the test period.
In addition, some of these devices are specifically designed to deter and detect test interference. Currently, some of the technically advanced active devices offer the most extensive device interference features. Although these tests may cost more, they may ensure the test is not interfered with.

General Information for All Devices

The Maine Radon/IAQ Program can explain the differences between devices and recommend the ones that are most appropriate for your needs and expected testing conditions.

Make sure to use a registered radon tester. The Maine Radon/IAQ Program regulates them, and can give you names of those in your area.

Certain precautions should be followed to avoid interference during the test period. Refer to the *Radon Testing Checklist* on page 23 for more information on how to get a reliable test result.

In some areas, companies offer different types of radon service agreements. Some agreements let you pay a one-time fee that covers both testing and, if necessary, radon mitigation. Contact the Maine Radon/IAQ Program to find out if a company offering this service is registered to provide radon services in Maine.

Radon Test Device Placement

Maine regulations require testing a home in the lowest usable level– usually the basement. A basement less than 6 ft. high, or that can not be accessed from the house would normally not be tested. A crawl space should never be tested.

What about EPA guidelines that say to test the lowest living level of the home? For Real Estate transactions, EPA actually says to **test in the lowest level that a buyer could use for living space without renovations – usually the basement.**

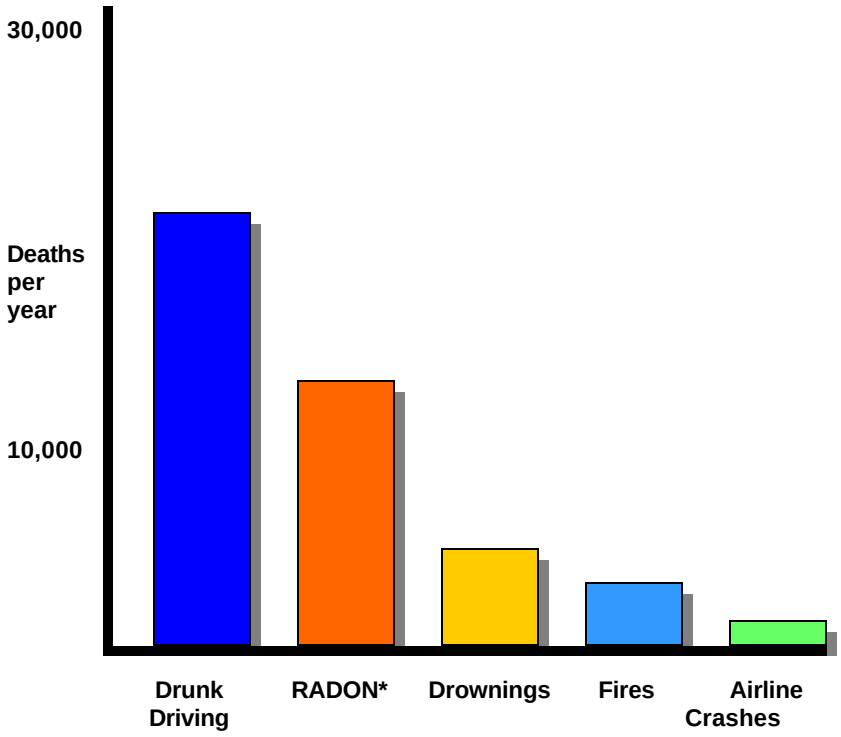
Length of Time to Test

Because radon levels vary from day to day and season to season, a short-term test is less likely than a long-term test to tell you your year-round average radon level. However, due to the need to get results quickly when testing for real estate purposes, a short-term test may be used to decide whether to fix the home. The short term test protocols were developed to ensure accurate, reliable results without the need for long term tests.

(continued on page 20)

Radon Summary

- If you are buying or selling a home, have it tested for radon.
- For a new home, ask if radon-resistant construction features were used and if the home has been tested.
- Fix your home if your radon level is 4 picoCuries per liter (pCi/L) or higher.
- Radon levels less than 4 pCi/L still pose a risk, and in many cases can be reduced.



* Radon is estimated to cause about 14,000 deaths per year.

Radon is a cancer-causing, radioactive gas.

Radon is estimated to cause many thousands of deaths each year. It is an odorless, tasteless, invisible gas. When you breathe air containing radon, you can get lung cancer. Radon is the second leading cause of lung cancer in the United States today. Only smoking causes more lung cancer deaths. **If you smoke and your home has high radon levels, your risk of lung cancer is especially high.**

Radon can be found all over the U.S.

Radon comes from the natural (radioactive) breakdown of uranium in soil, rock and water and gets into the air you breathe. Radon can be found all over the U.S. It can get into any type of building - homes, offices, and schools - and build up to high levels. You and your family are most likely to get exposed at home because that's where you spend most of your time.

If you are buying or selling a home, you should test for radon.

Testing is the only way to know if there is a radon problem in the home. Testing is inexpensive and easy - it should only take a few minutes of your time. Millions of Americans have already tested their homes for radon.

You can fix a radon problem easily and cheaply.

There are simple ways to fix a radon problem that aren't too costly. Even very high levels can be reduced to acceptable levels.

Short-term tests remain in your home from two days to 90 days, usually between two and seven days. Both passive and active devices can be used (see pages 15—17 for more details). Remember- **all radon tests *must* be taken for a minimum of 48 hours**. A longer period of testing is required for some devices. **If the test is less than four days long, all windows and doors must be closed 12 hours before the test begins**.

Preventing or Detecting Test Interference

Radon tests may give false results if there is interference with the testing. There are several ways to prevent or detect test interference, such as:

- Using a test device that frequently records radon or decay product levels to detect unusual swings;
- Employing motion detectors to determine whether the test device has been moved or testing conditions have changed;
- Recording the barometric pressure to identify weather conditions that may have affected the test;
- Recording the temperature to help assess whether doors and windows have been opened; and
- Applying tamper-proof seals to windows to ensure closed house conditions.

Home buyers and sellers should evaluate these and other features when selecting a radon test alternative.

Using Testing Devices Properly for Reliable Results

When having a short term test taken, close your windows and outside doors and keep them closed during the test, except for normal entry and exit. If you are taking a short-term test lasting less than four days, be sure:

- To close your windows and outside doors at least 12 hours before beginning the test;.
- The tester does not conduct short-term tests during severe storms or periods of high winds.
- The test device is at least 20 inches above the floor in a location where it will not be disturbed and where it will be away from drafts, high heat, high humidity, and exterior walls. This is for tests lasting more than 4 days, also.
- The tester leaves the test kit in place for as long as the test instructions say;.

Short-Term Testing Options	**What To Do Next**
Passive:	
Take two short-term tests at the same time in the same location for at least 48 hours.	Fix the home if the average of two tests is 4 pCi/L or more.
or	
Take an initial short-term test for at least 48 hours. When you end that test, immediately begin another short-term test for at least 48 hours.	Fix the home if the average of two tests is 4 pCi/L or more.
Active:	
Test the home with a continuous monitor for at least 48 hours.	Fix the home if the average radon level is 4 pCi/L or more.

When Choosing a Short-Term Testing Option…

There are trade-offs among the short-term testing options. One test followed by another test (sequential) would most likely give a better representation of the seasonal average. Two tests taken at the same time (simultaneous) would improve the precision of this radon test. Both active and passive devices may have features which help to prevent test interference. The Maine Radon/IAQ Program can help you decide which option is best.

- Once the test is finished, the tester reseals the package and returns it immediately to the lab specified on the package for analysis.

Your tester should have your test results within a few days to a week. If you need results very quickly, ask your tester about expedited service.

What To Expect From A Registered Radon Tester

A registered radon tester knows the proper conditions, test devices, and guidelines for obtaining a reliable radon test result. A professional radon tester can also:

- Evaluate the home and recommend a testing approach designed to make sure you get reliable results;
- Explain how proper conditions can be maintained during the radon test;
- Emphasize to occupants of a home that a reliable test result de-

pends on their cooperation because any interference with the test or closed-house conditions, especially during short-term testing, will invalidate the test result; Some testers include an "Acceptance of Closed House Conditions" form which the occupant (s) are asked to sign. Ask your tester if he uses such a form.

- Analyze the data and report measurement results; and

- Provide an independent test by someone who is not involved in the home sale.

Contact the Maine Radon/IAQ Program (207-287-5698; toll free in Maine only: 1-800-232-0842) or on the web at *www.maineradiationcontrol.org* for information about registered radon testers.

The Radon Testing Checklist

Follow this *Radon Testing Checklist* **carefully** so that you get the most accurate radon test results. Testing for radon is not a complicated process, but it must be done properly. Otherwise, the test results may not be accurate and more testing may have to be done.

Disturbing or interfering with the test device or closed-house conditions will invalidate the test results. The seller, or a registered radon tester, should be able to confirm that all items have been completed. If not, another test should be taken.

Before Conducting a Radon Test:

- ☐ Notify the occupants of the importance of proper testing conditions. Give the occupants written instructions or a copy of this Guide and explain the directions carefully.

- ☐ It is important to maintain closed-house conditions for at least 12 hours before the beginning of the test and during

the entire test period. Do not operate fans or other machines that bring in air from the outside.

- ☐ The tester must use a test device from a registered radon lab or be registered to use a state approved continuous monitor. The Maine Radon/IAQ Program can tell you if the device being used in your house is from a registered lab or company.

- ☐ Make sure the tester is registered to provide radon services in Maine. Maine issues an ID card to registered testers and mitigators. Ask to see it. Also, the tester's Maine registration ID number should be included on the test report.

- ☐ The test should include method(s) to prevent or detect interference with testing conditions or with the testing device itself.

- ☐ Check to see if an active radon-reduction system is in the house. Before taking a test, make sure the vent fan, if any, is operating at least 24 hours before the beginning of the test.

- ☐ Short-term tests *must* be done under closed-house conditions. Closed-house conditions means keeping all windows closed, keeping doors closed except for normal entry and exit, and not operating fans or other machines that bring in air from outside. Note that fans that are part of a radon-reduction system or small exhaust fans operating for only short periods of time may run during the test.

During a Radon Test:

- Conduct the radon test for a minimum of 48 hours. Certain devices must be exposed for more than the 48-hour minimum.

- Maintain closed-house conditions during the entire time of a short term test.

- Operate the home's heating and cooling systems normally during the test. For short-term tests, operate only air-conditioning units that re-circulate interior air.

- Do not disturb the test device at any time during the test.

- If a radon-reduction system is in place, make sure the system is working properly and will be in operation during the entire radon test.

After a Radon Test:

- Be sure the test device is returned to the laboratory promptly.

- If a high level is found, fix the home. Contact a registered radon-reduction contractor (mitigator) about lowering the radon level.

- Be sure that the radon tester can demonstrate or provide information to ensure that the testing conditions were not violated during the testing period.

Interpreting Radon Test Results

Radon test results can be reported in two ways. Your radon test results may be reported in either picocuries per liter of air (pCi/L) or working levels (WL). **If your test result is in pCi/L, Maine recommends you fix your home if your radon level is 4 pCi/L or higher. If the test result is in WL, Maine recommends you fix the home if the working level is 0.02 WL or higher.**

The average indoor radon level is estimated to be about 1.3 pCi/L nationally, and about 4.1 pCi/l in Maine. About 0.5 pCi/L of radon is normally found in the outside air. The U.S. Congress has set a long-term goal that indoor radon levels be no more than outdoor levels. While this goal is not yet technologically achievable for all homes, radon levels in most homes *can* be reduced to 2 pCi/L or below.

However, Maine, the US EPA, and the US Surgeon General believe that any radon exposure carries some risk; **no level of radon is safe**. Even radon levels below 4 pCi/L pose some risk. You can reduce your risk of lung cancer by lowering your radon level.

Sometimes short-term tests are less definitive about whether the home is at or above 4 pCi/L, particularly when the results are close to 4 pCi/L. For example, if the average of two short-term tests is 4.1 pCi/L, there is a chance that the year-round average is below 4 pCi/L.

As with other environmental health hazards, there is some uncertainty about the size of radon health risks. However, we know more about radon risks than risks from most other cancer-causing substances. This is because estimates of radon risks are based on data from human studies (underground miners and on-going studies in homes). Additional studies are under way. Your radon measurement will give you an idea of your risk of getting lung cancer from radon. Your chances of getting lung cancer from radon depend mostly on:

- Your home's radon level;
- The amount of time you spend in your home; and
- Whether you are a smoker or have ever smoked.

Smoking combined with radon is an especially serious health risk. **If you smoke or are a former smoker, the presence of radon**

greatly increases your risk of lung cancer. If you stop smoking now and lower the radon level in your house, you will reduce your lung cancer risk substantially.

What Should I Do If the Radon Level Is High?

High Radon Levels Can be Reduced

Maine, the US EPA and the Surgeon General recommend that you take action to reduce your home's indoor radon levels if your radon test result is 4 pCi/L or higher. It is better to correct a radon problem before placing your home on the market because then you have more time to address a radon problem. If elevated levels are found during the real estate transaction, the buyer and seller should discuss the timing and costs of the radon reduction.

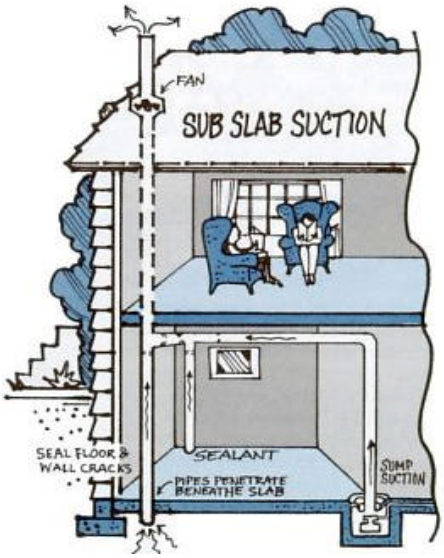
The cost of making repairs to reduce radon levels depends on how your home was built and other factors. Most homes can be fixed for about the same cost as other common home repairs, like painting or having a new hot water heater installed. The average cost for a contractor to lower radon levels in a home is about $1,200. The level of radon in your home has no bearing on the cost of installing a mitigation system, nor will a high level typically make reduction below 4 pCi/l more difficult.

How To Lower The Radon Level In Your Home

A variety of methods can be used to reduce radon in homes, called radon mitigation. Sealing cracks and other openings in the foundation is a part of most mitigation methods. **Maine and the EPA do not recommend the use of sealing alone to limit radon**

entry. Sealing alone has not been shown to lower radon levels significantly, permanently or consistently.

Several mitigation methods can be used to reduce radon in your home. The most reliable, most durable, and least expensive method is a simple system using pipes and fans. This system, called “sub-slab depressurization” or “sub-slab suction”, does not require major changes to your home. This type of system removes radon gas from below the concrete floor and the foundation before it can enter the home. Similar systems can also be installed in houses with dirt floored basements or crawl spaces. Radon contractors use other methods that may also work in your home. The right method depends on the design of your home and other factors.



As with any other household appliance, there are costs associated with the operation of the radon mitigation system. For most “sub-slab depressurization” systems, the costs are similar to having a 40 to 70 watt light bulb turned on. Other radon mitigation methods are discussed in the “Maine Guide to Radon Reduction" .

You should also test your home again after it is fixed to be sure that radon levels have been reduced. If your living patterns change, such as making a bedroom or family room in the basement you should retest your home on that level. In addition, all homes with a mitigation system should retest every two years to ensure the system is still working and that radon levels are low.

Selecting a Radon-Reduction (Mitigation) Contractor

You should select a registered radon-reduction contractor (mitigator) to reduce the radon levels in your home. Any mitigation measures taken or systems installed in your home must conform to current radon mitigation standards. The Maine Radon/ IAQ program can give you information on those standards as well as provide a list of registered mitigators.

Any mitigation contractor will want to review the radon measurement results before beginning any radon-reduction work. It helps them determine what will work best for your home. They will also tell you that a radon test is required after the radon mitigation work has been completed. This post-mitigation radon test should be done by an independent, registered radon tester. Some mitigators are also registered testers, and can do this test for you if you prefer.

Choose a radon mitigation contractor to fix your radon problem just as you would for any other home repair. You may want to get more than one estimate and check their references. Make sure the person you hire is registered to install a mitigation system. Contact the Maine Radon/IAQ Program (207-287-5698; toll free in

Radon and Home Renovations

If you are planning any major renovations, such as converting an unfinished basement area into living space, it is especially important to test the area for radon before you begin.

If your test results indicate an elevated radon level, radon-resistant techniques can be inexpensively included as part of the renovation. Major renovations can change the level of radon in any home. Test again after the work is completed.

Maine only: 1-800-232-0842) or on the web at *www.maineradiationcontrol.org* for a list of registered radon mitigators in your area.

A registered radon-reduction (mitigation) contractor should be able to:

- Review testing guidelines and measurement results, and determine if additional measurements are needed;
- Evaluate the radon problem and provide you with a detailed, written proposal on how radon levels will be lowered;
- Design a radon-reduction system;
- Install the system according to current Maine standards, and State or local codes; and

- Make sure the finished system effectively reduces radon levels to acceptable levels.

Should Your Radon Tester Also Be Your Radon-Reduction Contractor?

Be aware that there is a potential conflict of interest if you use the same person or firm to conduct both the testing and the installation of a radon mitigation system. If the same person or firm that does the testing also offers to do radon reduction for the home, make sure the testing is done in accordance with the *Radon Testing Checklist*. Contact the Maine Radiation Control Program office for more information.

Make sure you hire only qualified/state certified measurement and mitigation contractors. You should check references and consider getting more than one cost estimate from radon measurement and mitigation companies in your area. Some states have additional certification requirements and may require the homeowner to sign a waiver if one firm conducts both testing and radon reduction. Contact the Maine Radiation Control Program office for more information.

Is There Radon in My Water?

Radon gas can enter the home through well water. Compared with radon entering the home through soil, radon entering the home through water will in most cases be a smaller source of risk. It can be released into the air you breathe when water is used for showering and other household uses. Research suggests that swallowing water with high radon levels may pose risks, too, although risks from swallowing water containing radon are believed to be much lower than those from breathing air containing radon.

While radon in water is not a problem in homes served by most public water supplies, it has been found in well water. **Very high concentrations of radon can be found in Maine drinking water.** The Maine Bureau of Health recommends radon concentrations in drinking water of 20,000 pCi/L or above be reduced. Studies have shown that nearly **one in five Maine wells** have radon concentrations this high or higher. Several in Maine have radon concentrations above *one million* pCi/L.

If the water in the home you are buying or selling comes from a private well, you should have your radon tester do a test for radon in water. This test is different than a radon in air test, and the requirements for the tester are different, too. Not all registered radon in air testers can test for radon in water. Contact the Maine Radon/IAQ Program (207-287-5698; toll free in Maine only: 1-800-232-0842) or on the web at *www.maineradiationcontrol.org*) for the names of registered radon in water testers in your area. If you are on a public water supply and are concerned that radon may be entering your home through the water, call your public water supplier.

Radon problems in water can be easily fixed. The most effective treatment is to remove radon from the water before it enters the home. This is called point-of-entry treatment. Treatment at your water tap is called point-of-use treatment. Unfortunately, point-of-use treatment will not reduce most of the inhalation risk from radon.

If the home you are buying or selling has a private well and you are concerned about radon, have the water tested now.

You can find more information about radon in water by contacting the Maine Radon/IAQ Program (207-287-5698; toll free in Maine only: 1-800-232-0842) or on the web at *www.maineradiationcontrol.org*. Additional information is also available at www.epa.gov/OGDW/radon/html

Some Common Myths About Radon

MYTH: *Scientists are not sure that radon really is a problem.*

FACT: Although some scientists dispute the precise number of deaths due to radon, all the major health organizations (like the Centers for Disease Control and Prevention, the American Lung Association and the American Medical Association) agree with estimates that radon causes thousands of preventable lung cancer deaths every year. This is especially true among smokers, since the risk to smokers is much greater than to non-smokers.

MYTH: *Radon testing is difficult, time-consuming and expensive.*

FACT: Radon testing is inexpensive and relatively easy -- it should take only a little of your time. However, follow the directions carefully to assure an accurate, reliable measurement of radon.

MYTH: *Radon testing devices are not reliable and are difficult to find.*

FACT: Reliable testing devices are readily available from the many Maine registered radon testing labs. Contact the Maine Radon/IAQ Program (207-287-5698; toll free in Maine only: 1-800-232-0842) or on the web at *www.maineradiationcontrol.org* for the names of labs near you.

MYTH: ***Homes with radon problems can't be fixed or fixed economically.***
MYTH: ***Homes with radon problems can't be fixed, or can't be fixed economically.***

FACT: There are solutions to radon problems in homes. Thousands of homeowners have already fixed radon problems in their homes. Radon levels can be readily lowered for $900 to $2,500. Contact the Maine Radon/IAQ Program (207-287-5698; toll free in Maine only: 1-800-232-0842) or on the web at *www.maineradiationcontrol.org* for information on how to acquire the services of a registered professional.

MYTH: ***Radon affects only certain kinds of homes.***

FACT: House construction can affect radon levels. However, radon can be a problem in homes of all types: old homes, new homes, drafty homes, insulated homes, homes with basements and homes without basements.

MYTH: ***Radon is only a problem in certain parts of the country.***

FACT: High radon levels have been found in every state, including Maine. In fact, Maine has radon concentrations that are generally higher than much of the country. The average home radon concentration in Maine is 4.1 picocuries per liter (pCi/L). This is much higher than the national average of 1.4 pCi/L. Radon problems do vary from area to area, but the only way to know your home's radon level is to test.

MYTH: ***A neighbor's test result is a good indication of whether your home has a problem.***

FACT: Radon levels vary greatly from home to home. The only way to know if your home has a radon problem is to test it.

Need More Information About Radon?

For more information on how to reduce your radon health risk, call the Maine Radon/IAQ Program (207-287-5698; toll free in Maine only: 1-800-232-0842) or on the web at *www.maineradiationcontrol.org.* Other radon information is available from the US EPA at www.epa.gov/iaq/radon/pubs. Other Indoor Air Quality-specific publications are located at www.epa.gov/iaq/pubs/ .

Toll Free Radon Hotline:

Maine Radon Hotline: 1-800-232-0842

For other Indoor Air Hotlines: www.epa.gov/iaq/iaqxline.html.

Web Sites:

Maine Radon/IAQ Program (part of the Maine Radiation Control Program) *www.maineradiationcontrol.org*. Includes information on radon in air, radon in water, Maine radon regulations, radon resistant new construction, Maine radon publications, and radon links.

EPA's main radon page (http://www.epa.gov/iaq/radon/index.html). Includes links to the NAS radon report, the map of radon zones, radon publications, hotlines and more.

EPA's radon publications (http://www.epa.gov/iaq/radon/pubs). Offers the full text version of EPA's radon publications.

EPA's main page on radon in water (http://www.epa.gov/safewater/radon.html). Includes information on statutory requirements and links to the drinking water standards program.

Obtain a copy of this publication from:

Radon/Indoor Air Quality Section
Radiation Control Program
Department of Human Services
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Augusta ME 04333-0011
Tel: 207-287-5698
Toll Free (in Maine only): 1-800-232-0842
Fax: 207-287-3059
http://www.maineradiationcontrol.org

Contents of this booklet have been adapted from the EPA's "A Citizen's Guide to Radon (Third Edition)" and EPA's "Home Buyers and Sellers Guide to Radon (Second Edition)".
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